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Song

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(54) **PARKING GUIDANCE CAMERA APPARATUS AND METHOD OF INSTALLING THE SAME**

(56) **References Cited**

U.S. PATENT DOCUMENTS

2016/0148762	A1 *	5/2016	Chichy	H02B 13/0356
					348/376
2016/0150947	A1 *	6/2016	Marmor	A61B 1/00103
					600/110
2016/0191813	A1 *	6/2016	Wu	H04N 5/2252
					348/159
2017/0205687	A1 *	7/2017	Mitchell	F16M 11/2057

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FOREIGN PATENT DOCUMENTS

KR	10-0834409	B1	6/2008	
KR	20-2011-0000523	U	1/2011	
KR	10-1729655	B1	5/2017	
WO	WO-2009045056	A2 *	4/2009 F16M 11/2014

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OTHER PUBLICATIONS

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* cited by examiner

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H04N 5/232	(2006.01)
H04N 5/247	(2006.01)
G08G 1/14	(2006.01)

(57) **ABSTRACT**

A parking guidance camera apparatus is provided. An elastic pad of a pan tilt gimbal is in close contact with or separated from a lower surface of a pan tilt camera module in a main body housing to fix or release the tilt camera module. An outer portion of an operation lever is hinge-coupled to a holder to be vertically tilted in a state in which the elastic pad is seated on an upper surface of the outer portion of the operation lever in the main body housing. An upper portion of a fixing knob is screw-coupled to an inner portion of the operation lever to vertically tilt the operation lever according to a rotating direction thereof so that the elastic pad is in close contact with or separated from the pan tilt camera module.

(52) **U.S. Cl.**

CPC **H04N 5/2252** (2013.01); **G08G 1/14** (2013.01); **H04N 5/2253** (2013.01); **H04N 5/23299** (2018.08); **H04N 5/247** (2013.01)

(58) **Field of Classification Search**

None
See application file for complete search history.

6 Claims, 10 Drawing Sheets

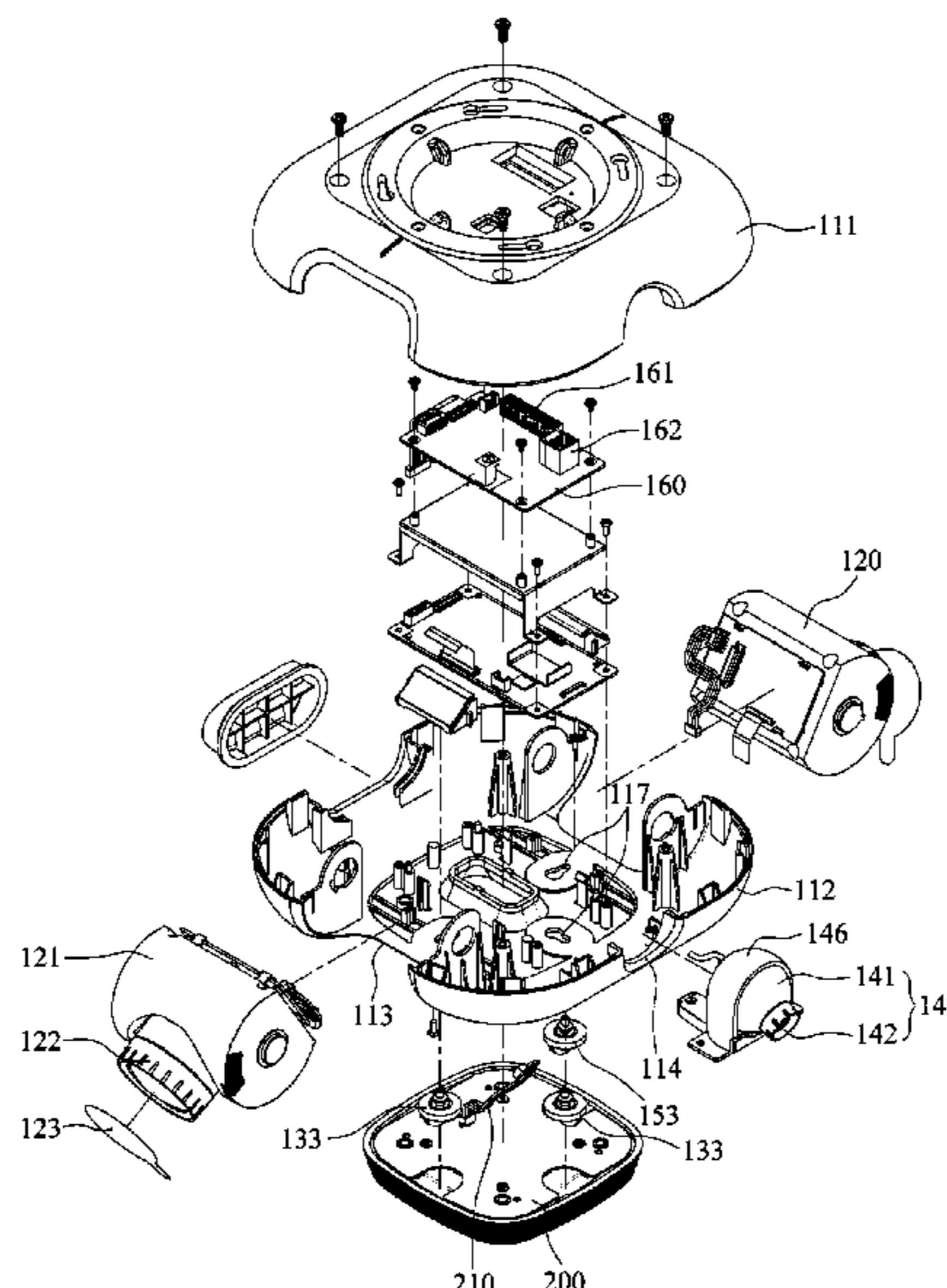


FIG. 1

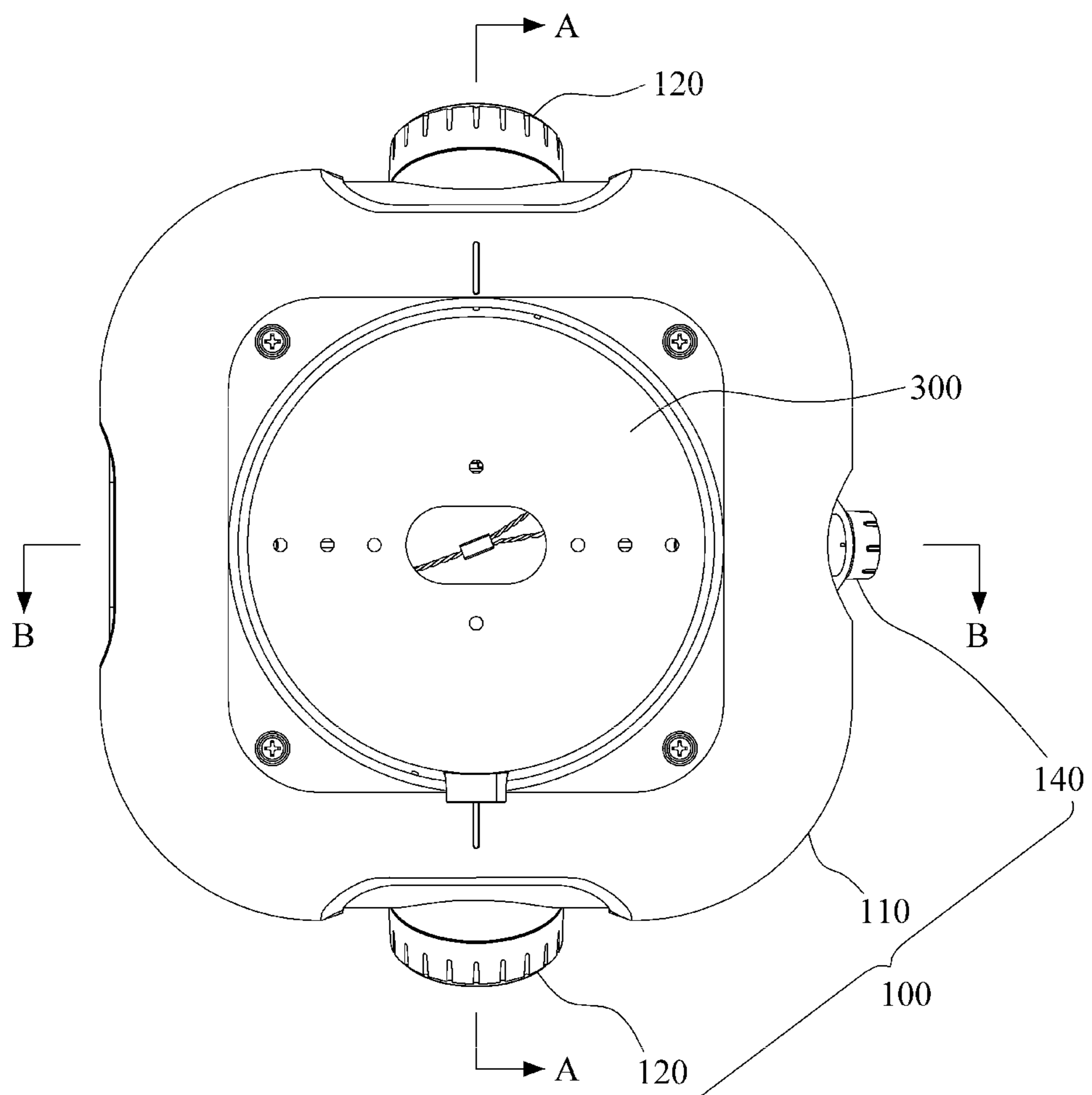


FIG. 2

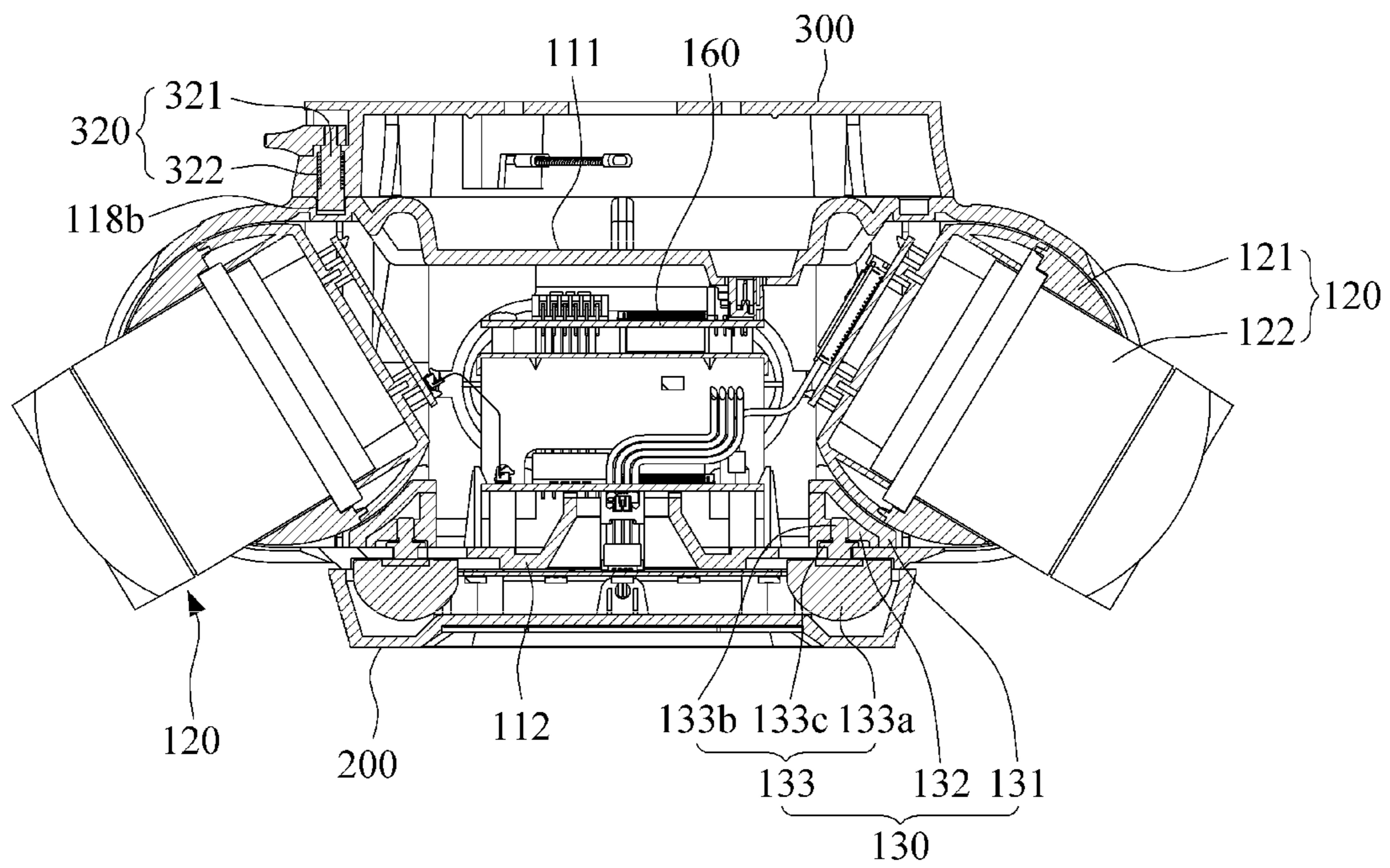


FIG. 3

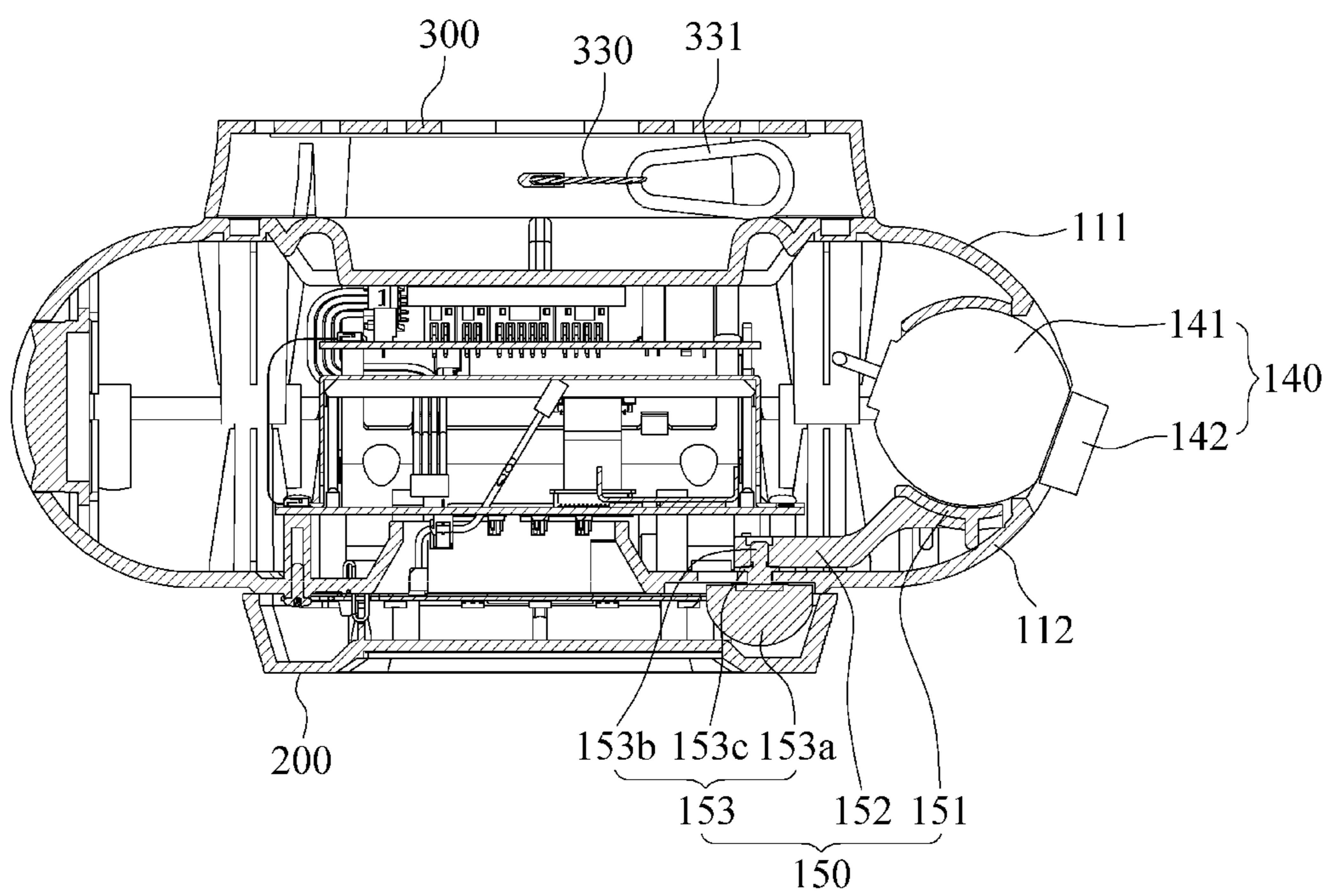


FIG. 4

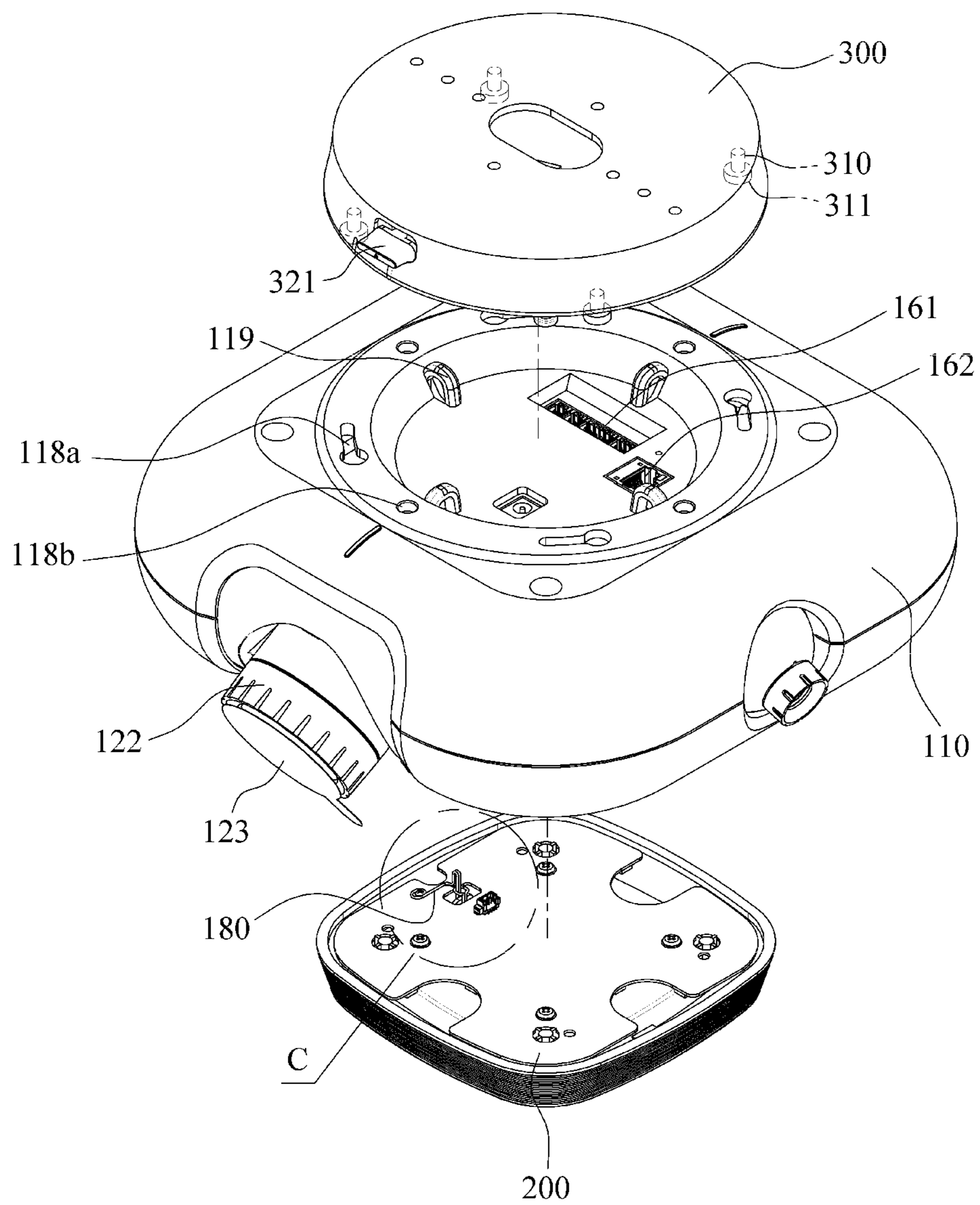


FIG. 5

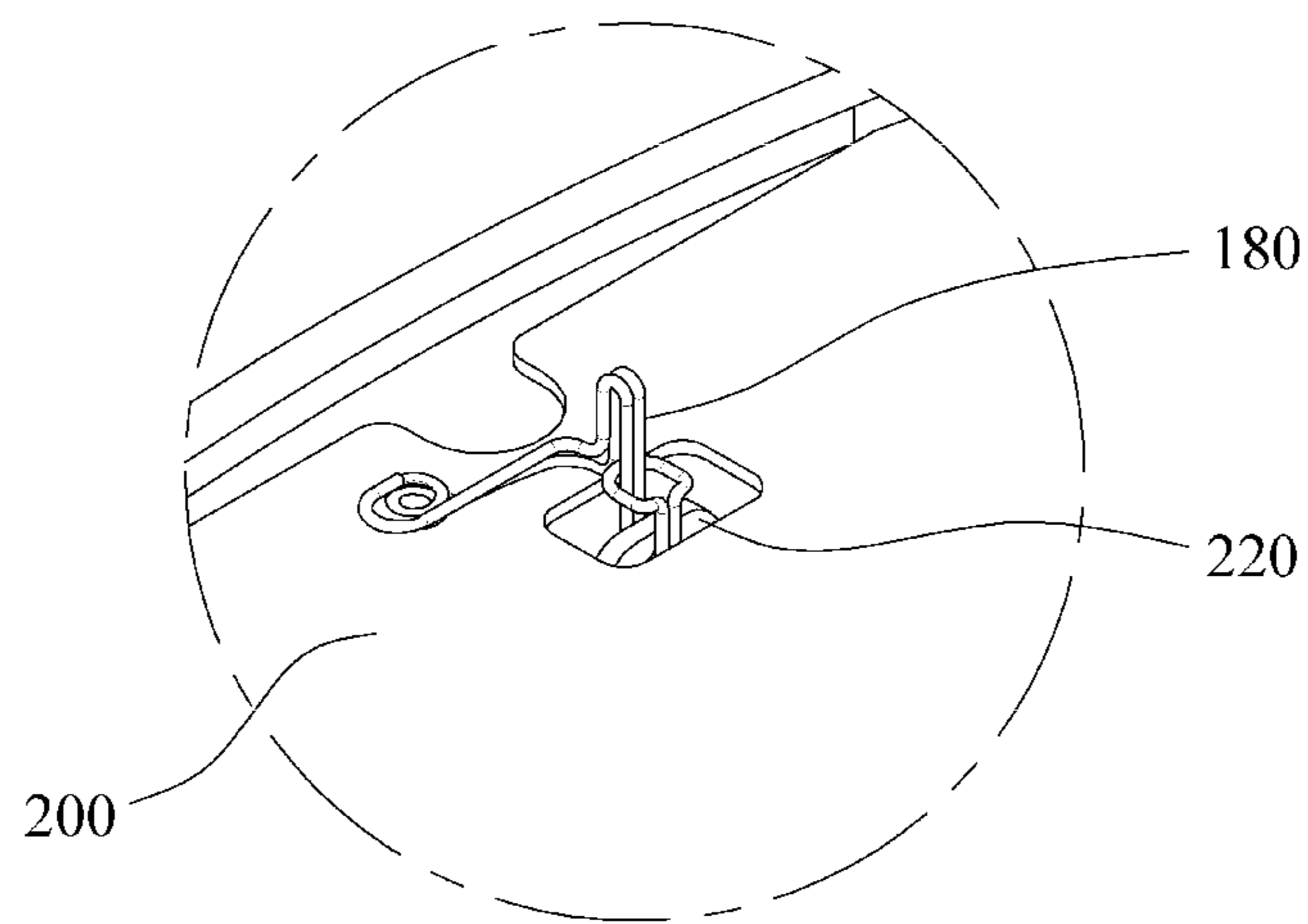


FIG. 6

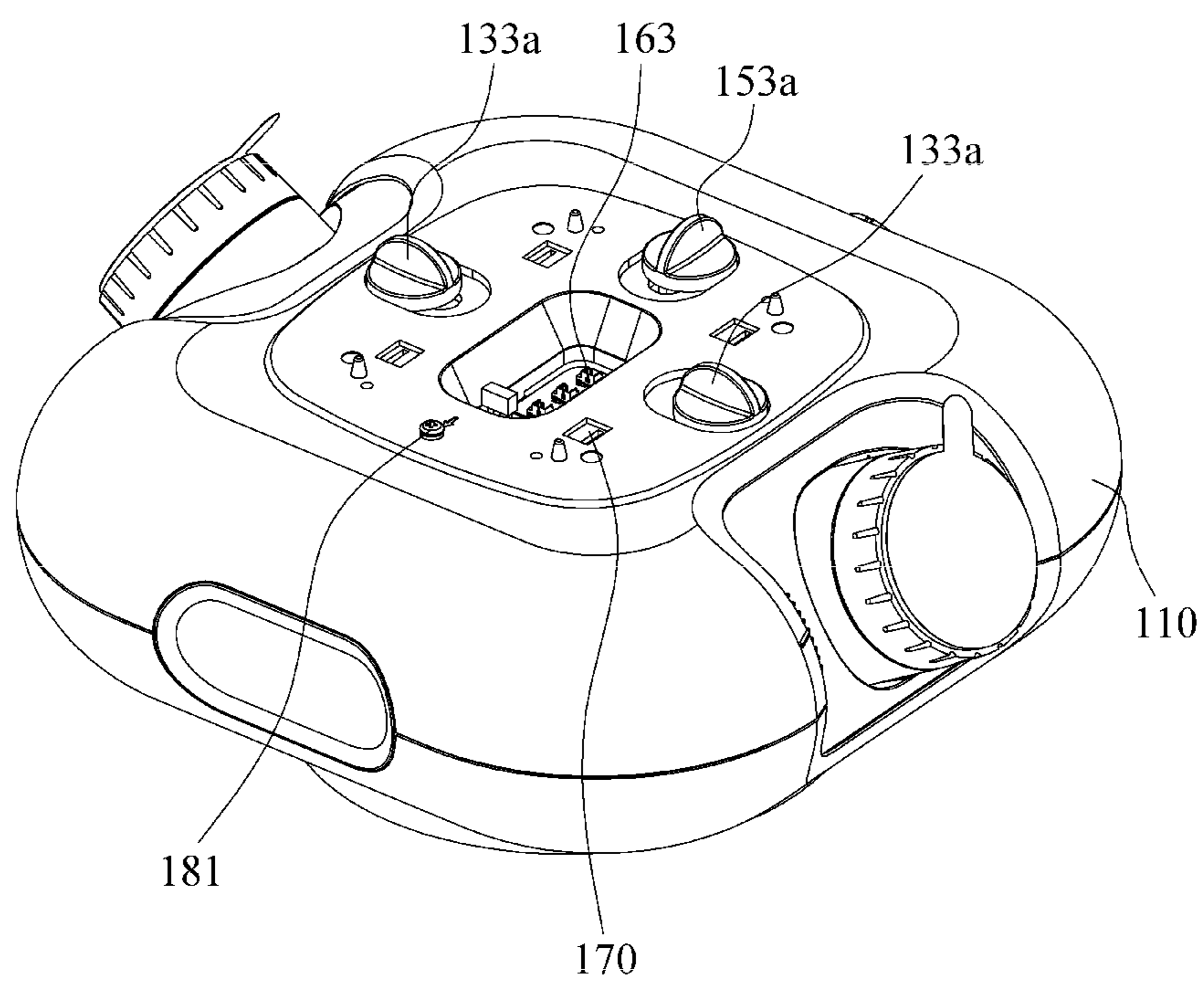


FIG. 7

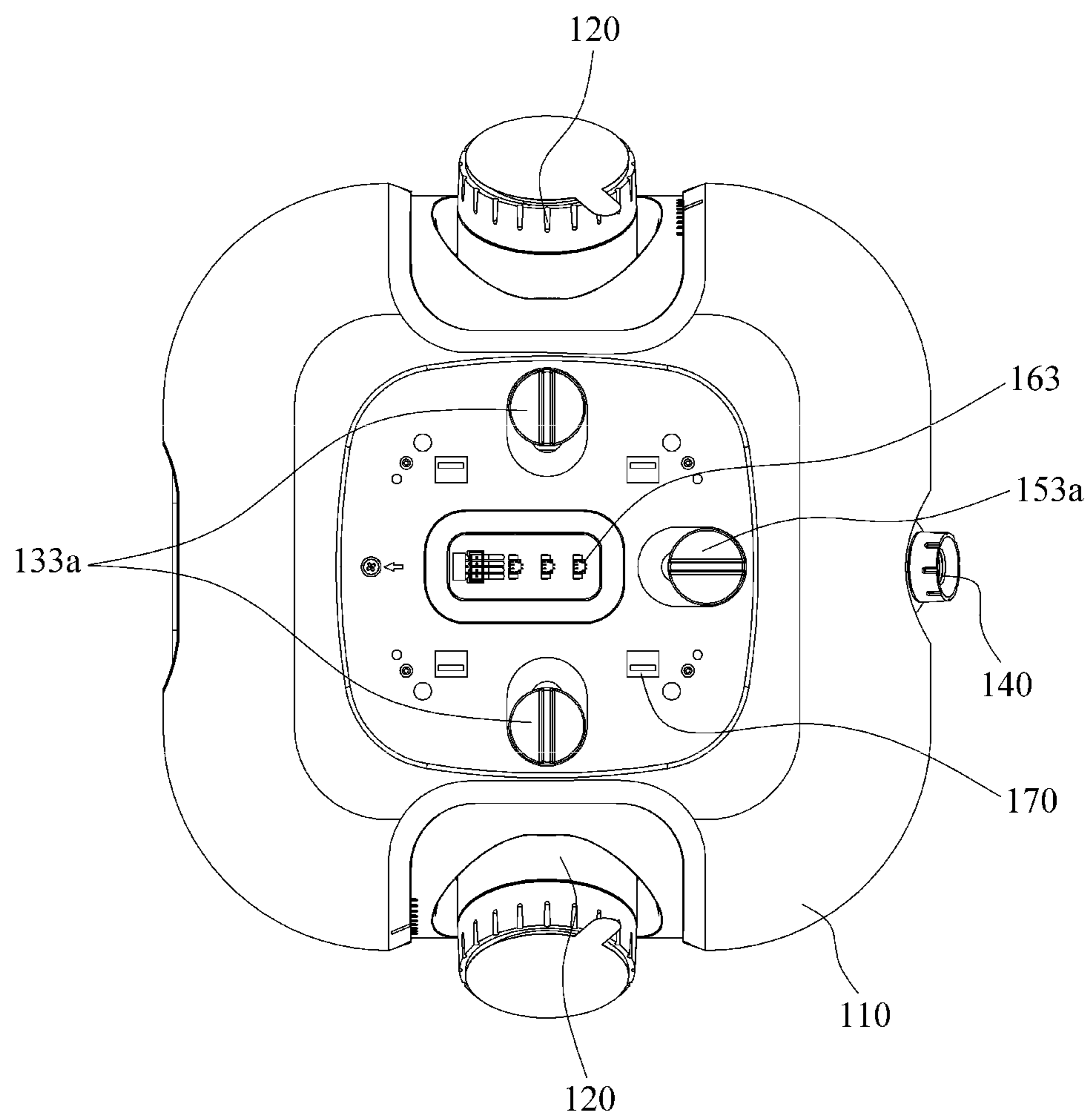


FIG. 8

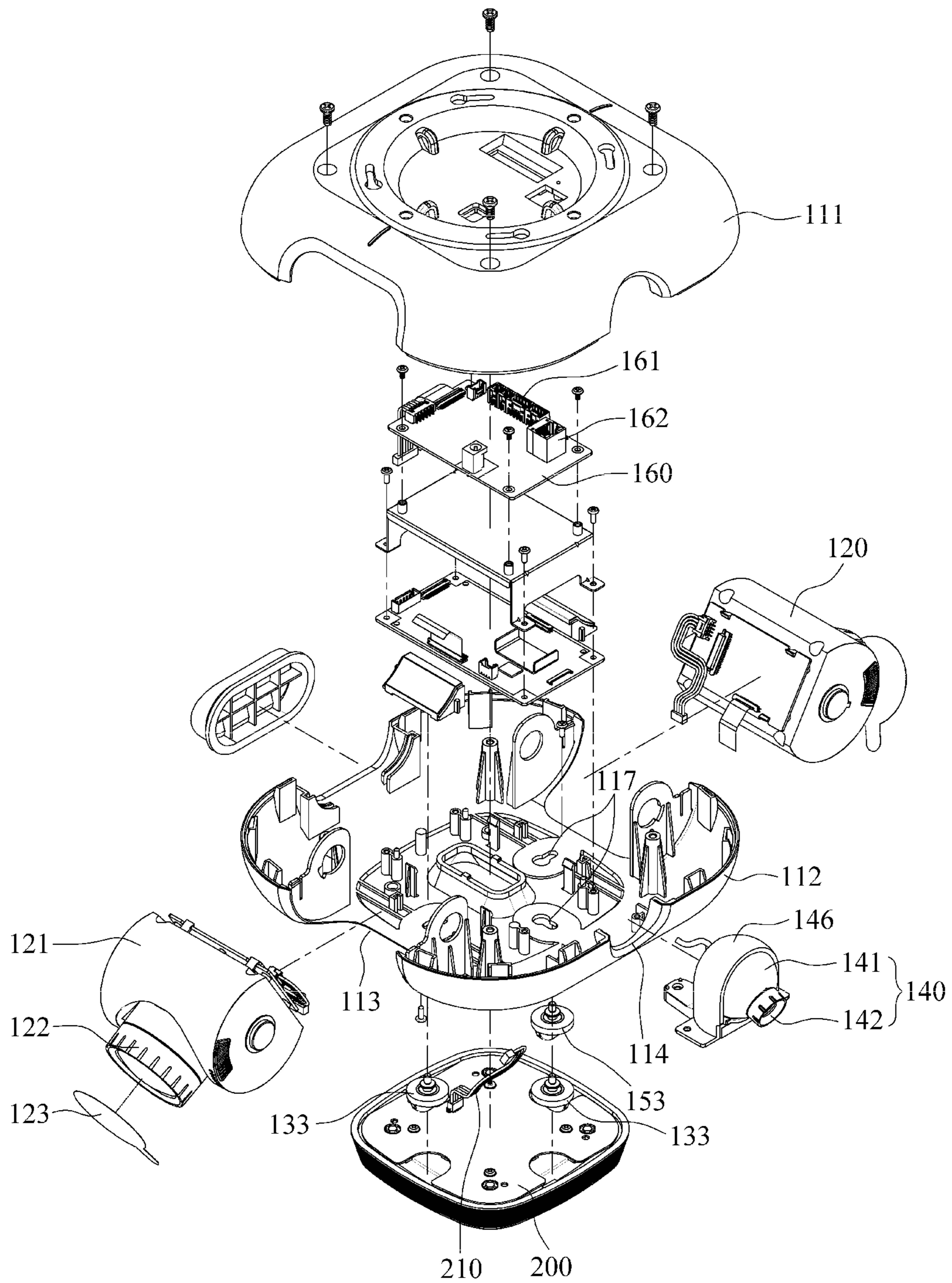


FIG. 9

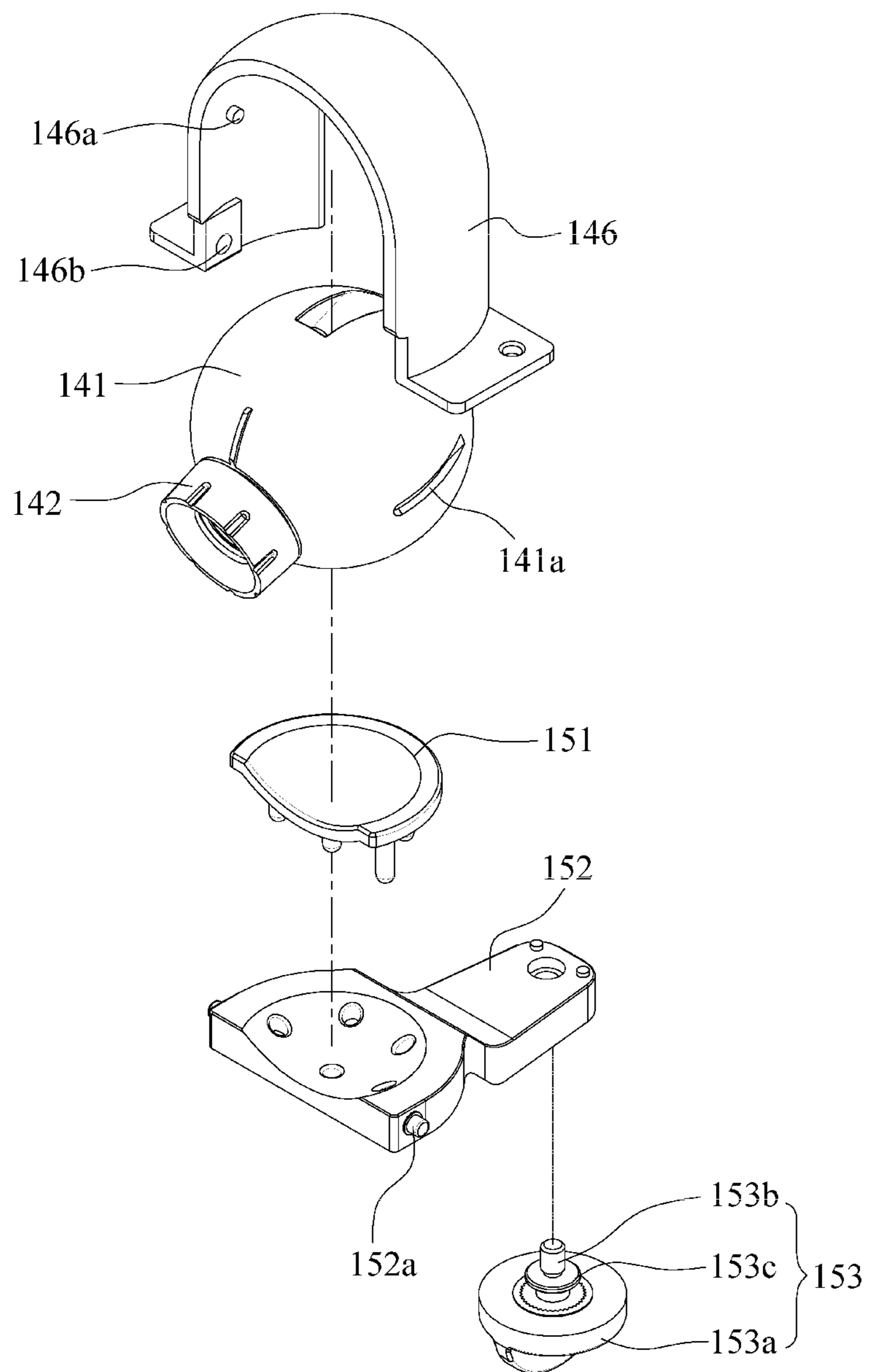
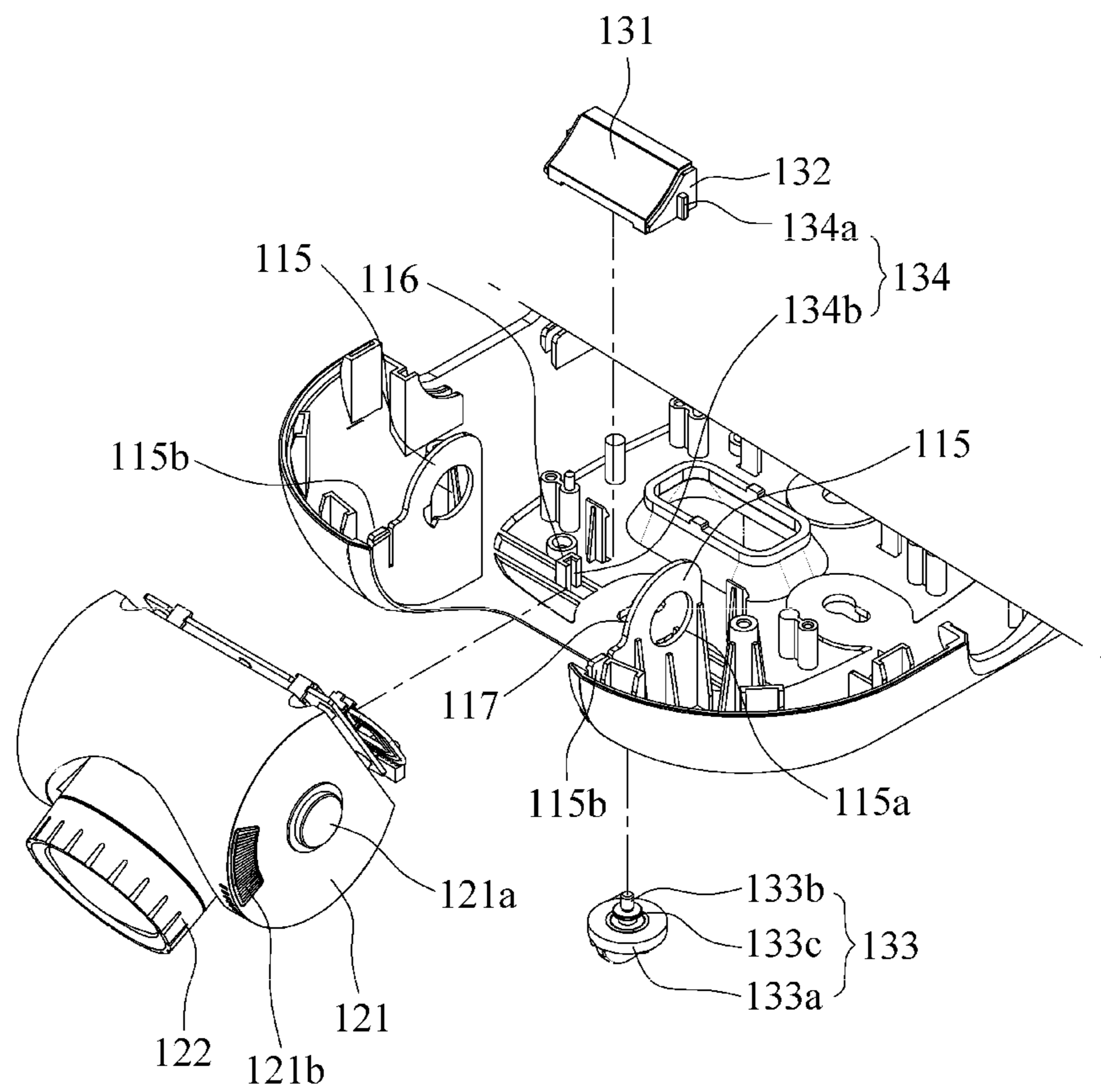


FIG. 10



**PARKING GUIDANCE CAMERA
APPARATUS AND METHOD OF
INSTALLING THE SAME**

CROSS-REFERENCE TO RELATED
APPLICATION

This application claims priority to and the benefit of Korean Registered Patent No. 10-2018-0033392, filed on Mar. 22, 2018, and Korean Registered Patent No. 10-2018-0033393, filed on Mar. 22, 2018, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

1. Field

The present disclosure relates to a camera apparatus, and more specifically, to a camera apparatus used for parking guidance.

2. Description of Related Art

Since the number of vehicles is increasing, a shortage of parking spaces is becoming a social issue. Particularly, a large building such as a department store, a superstore, an apartment, a hospital, or the like in which a plurality of vehicles frequently enter and exit has a problem with parking spaces even despite often having a multilayer parking space.

A large parking lot is formed of a plurality of parking surfaces (parking blocks) and a passage, and a driver can be inconvenienced while driving through the passage and finding the empty parking surface one by one to park in the parking lot. Although a method of disposing manpower in a parking lot to guide and show entry of vehicles is used, recently, a system in which an available parking area and entering vehicles are monitored and parking is guided is also suggested.

As an example, the parking guidance system uses a plurality of camera apparatuses installed in a ceiling of the parking lot. Meanwhile, the camera apparatus can be configured to manually adjust a photographing angle of a camera module according to an installation environment of the parking lot on the basis of a camera main body in a state of being installed in the parking lot, and in this case, installation convenience of the camera apparatus should be improved.

For example, according to a conventional camera apparatus, a camera module is supported by a camera main body at an adjustable angle and fixed by a gimbal in a state in which the angle is adjusted. Here, in the gimbal, an operation part configured to fix the camera module is located in the camera main body. Accordingly, a process of adjusting and fixing a photographing angle of the camera module will be described below.

First, a worker goes through processes of closing the inside of the camera main body using a cover after fixing the camera module by operating the operation part of the gimbal in a state in which the cover of the camera main body is removed to open the inside of the camera main body and the angle of the camera module is adjusted. As described above, since a process of fixing the camera module in a state in which the photographing angle of the camera module is adjusted is inconvenient, the installation convenience of the camera apparatus has many issues.

SUMMARY

The present disclosure relates to a parking guidance camera apparatus and a method of installing the same capable of enhancing the installation convenience.

In one general aspect, a parking guidance camera apparatus according to the present disclosure includes a camera main body, a parking guidance light, and an installation bracket. The camera main body includes a main body housing, a pan tilt camera module partially inserted into a camera mounting hole of the main body housing, a holder configured to support the pan tilt camera module on the main body housing so that the pan tilt camera module is laterally panned and vertically tilted, and a pan tilt gimbal configured to fix the pan tilt camera module in a state in which a panning angle and a tilting angle of the pan tilt camera module are adjusted. The parking guidance light is detachably attached to a lower portion of the main body housing. The installation bracket is provided to install the camera main body at a set location in a parking lot. The pan tilt gimbal includes an elastic pad, an operation lever, and a fixing knob. The elastic pad fixes or releases the pan tilt camera module as the elastic pad is in close contact with or separated from a lower surface of the pan tilt camera module in a state of facing the lower surface of the pan tilt camera module in the main body housing. An outer portion of the operation lever is hinge-coupled to the holder to be vertically tilted in a state in which the elastic pad is seated on an upper surface of the outer portion of the operation lever in the main body housing. An upper portion of the fixing knob is screw-coupled to an inner portion of the operation lever to vertically tilt the operation lever according to a rotating direction thereof so that the elastic pad is in close contact with or separated from the pan tilt camera module, and a lower end portion is covered by the parking guidance light in a state of being exposed to a lower portion of the main body housing.

Further, the camera main body may further include at least one tilt camera module supported by the main body housing to be vertically tilted in a state of being partially inserted into a camera mounting hole of the main body housing, and a tilt gimbal configured to fix the tilt camera module in a state in which a tilting angle of the tilt camera module is adjusted. Here, the tilt gimbal may include an elastic block configured to fix or release the tilt camera module as the elastic block is in close contact with or separated from a lower surface of the tilt camera module in a state of facing the lower surface of the tilt camera module in the main body housing, an elevation block supported by the main body housing to be elevated in a state in which the elastic block is seated, and a fixing knob having an upper portion screw-coupled to the elevation block to elevate the elevation block according to a rotating direction thereof so that the elastic block is in close contact with or separated from, the tilt camera module, and having a lower end portion covered by the parking guidance light in a state of being exposed to the lower portion of the main body housing.

In another general aspect, a method of installing a parking guidance camera apparatus according to the present disclosure includes installing an installation bracket at a set location of a parking lot and taking out a connection cable, engaging a camera main body with the installation bracket through a working cable of the installation bracket, connecting the connection cable to the camera main body, mounting the camera main body on the installation bracket, connecting an external monitor to a monitor connection port of the camera main body, allowing an elastic pad be in close

contact with a pan tilt camera module to fix the pan tilt camera module by rotating a fixing knob exposed to a lower portion of the camera main body to tilt an operation lever in an upward direction with respect to a holder after adjusting a panning angle and a tilting angle of the pan tilt camera module supported by the holder of the camera main body to be laterally panned and vertically tilted on the basis of image information provided through the external monitor, binding a parking guidance light to the camera main body through a safety wire and connecting the parking guidance light to the camera main body through a connector, and attaching the parking guidance light to the lower portion of the camera main body using a magnetic force in a state in which the parking guidance is covered by the fixing knob.

Further, the method may further include fixing a tilt camera module after connecting the external monitor by rotating a fixing knob exposed to the lower portion of the camera main body to raise an elastic block after adjusting a tilting angle of the tilt camera module supported by the camera main body to be vertically tilted on the basis of the image information provided through the external monitor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a parking guidance camera apparatus according to an embodiment of the present disclosure.

FIG. 2 is a cross-sectional view cut along line A-A in FIG. 1.

FIG. 3 is a cross-sectional view cut along line B-B in FIG. 1.

FIG. 4 is an exploded perspective view of FIG. 1.

FIG. 5 is an enlarged perspective view of area C in FIG. 4.

FIG. 6 is a bottom view of a camera main body.

FIG. 7 is a perspective view of the camera main body viewed from below.

FIG. 8 is an exploded perspective view of the camera main body.

FIG. 9 is an exploded perspective view illustrating a pan tilt camera module and a pan tilt gimbal extracted on the basis of FIG. 8.

FIG. 10 is an exploded perspective view illustrating a tilt camera module and a tilt gimbal extracted on the basis of FIG. 8.

Throughout the drawings and the detailed description, unless otherwise described, the same drawing reference numerals will be understood to refer to the same elements, features, and structures. The relative size and depiction of these elements may be exaggerated for clarity, illustration, and convenience.

DETAILED DESCRIPTION

The present disclosure will be described below in detail with reference to the accompanying drawings. Here, the same reference numerals are used for the same components in the description, and repeated descriptions and a detailed description for known functions and configurations which may unnecessarily obscure the spirit of the present disclosure will be omitted. Embodiments of the present disclosure are provided to more completely describe the present disclosure to those skilled in the art. Accordingly, a shape, a size and the like of elements in the drawings may be exaggerated for more clear description.

FIG. 1 is a plan view of a parking guidance camera apparatus according to an embodiment of the present dis-

closure. FIG. 2 is a cross-sectional view cut along line A-A in FIG. 1. FIG. 3 is a cross-sectional view cut along line B-B in FIG. 1. FIG. 4 is an exploded perspective view of FIG. 1. FIG. 5 is an enlarged perspective view of area C in FIG. 4. FIG. 6 is a bottom view of a camera main body. FIG. 7 is a perspective view of the camera main body viewed from below. FIG. 8 is an exploded perspective view of the camera main body.

Referring to FIGS. 1 to 8, the parking guidance camera apparatus according to an embodiment of the present disclosure includes a camera main body 100, a parking guidance light 200, and an installation bracket 300.

The camera main body 100 includes a main body housing 110, a pan tilt camera module 140, and a pan tilt gimbal 150. The main body housing 110 may include an upper housing 111 and a lower housing 112 which may be assembled to and disassembled from each other. Accordingly, the main body housing 110 may allow inner components to be easily assembled or disassembled.

At least one printed circuit board 160 may be mounted in the main body housing 110. The printed circuit board 160 may receive an external power signal and a control signal to output the external power signal and the control signal to the pan tilt camera module 140 and the parking guidance light 200 and may receive an image signal photographed from the pan tilt camera module 140 to output the image signal to the outside.

When the camera main body 100 includes at least one tilt camera module 120, the printed circuit board 160 may receive the external power signal and the control signal to output the external power signal and the control signal to the tilt camera module 120 and may receive an image signal photographed from the tilt camera module 120 to output the image signal to the outside.

The printed circuit board 160 may include terminals to be connected to the tilt camera module 120, the pan tilt camera module 140, and the parking guidance light 200. A power input port 161 and a communication port 162 may be mounted on the printed circuit board 160 and exposed through an upper portion of the main body housing 110. That is, openings may be formed in a center of an upper surface of the main body housing 110 to expose the power input port 161 and the communication port 162 therethrough.

Further, at least one monitor connection port 163 may be mounted on the printed circuit board 160 and exposed from a lower portion of the main body housing 110. That is, openings may be formed in a center of a lower surface of the main body housing 110 to expose the monitor connection port 163 therethrough. The number of monitor connection ports 163 may be provided according to the number of tilt camera modules 120 and pan tilt camera modules 140.

The monitor connection ports 163 are connected to an external monitor so that image information photographed from the tilt camera modules 120 and the pan tilt camera modules 140 may be output to the external monitor. A worker may adjust a tilting angle of the tilt camera module 120 and a pan angle and a tilting angle of the pan tilt camera module 140 on the basis of the image information provided through the external monitor.

The main body housing 110 has camera mounting holes 113 and 114 in side surfaces thereof. For example, when the camera main body 100 includes a pair of tilt camera modules 120 and one pan tilt camera module 140, the main body housing 110 has the camera mounting holes 113 in two side surfaces facing each other among four side surfaces thereof to partially accommodate the tilt camera modules 120 and has the camera mounting hole 114 in another one side

surface to accommodate the pan tilt camera module **140**. The camera mounting holes **113** and **114** may be configured according to a shape of each of the tilt camera modules **120** and the pan tilt camera module **140**.

The pan tilt camera module **140** is partially inserted into the camera mounting hole **114** of the main body housing **110**. The pan tilt camera module **140** may be laterally panned and vertically tilted by a holder **146** according to an installation environment of a parking lot, and a photographing angle of the pan tilt camera module **140** may be adjusted. The pan tilt camera module **140** photographs a corresponding area in real time so that the photographed image information is provided to a parking guidance managing server or the like through wired and wireless communications.

The pan tilt camera module **140** includes a lens forming an optical image of a subject and includes an image sensor configured to convert the optical image formed by the lens to an electrical signal. The pan tilt camera module **140** may include a casing **141** configured to embed the image sensor therein, and a lens barrel **142** on which the lens is mounted. The casing **141** may be formed in a spherical shape. The lens barrel **142** may be connected to the casing **141** in a protruding shape. The holder **146** may be supported by the main body housing **110** to be capable of laterally panning and vertically tilting the pan tilt camera module **140**.

Referring to FIGS. **8** and **9**, an upper portion of the holder **146** may be formed to be curved in curvature the same as that of the casing **141** and a lower portion may surround the casing **141** in an open shape. The holder **146** may have a lower portion bolted in the main body housing **110** to be fixed. The holder **146** includes a support protrusion **146a** on each of both inner side surfaces thereof. The casing **141** may have support grooves **141a** elongated in frontward and backward directions on the basis of the lens barrel **142** in both side surfaces thereof. The support protrusions **146a** are fitted into the support grooves **141a** to support lateral panning and vertical tilting of the casing **141**. Accordingly, the pan tilt camera module **140** may be supported to be laterally panned and vertically tilted on the basis of the main body housing **110**.

The pan tilt gimbal **150** fixes the pan tilt camera module **140** in a state in which the pan angle and the tilting angle of the pan tilt camera module **140** are adjusted. The pan tilt gimbal **150** includes an elastic pad **151**, an operation lever **152**, and a fixing knob **153**. The elastic pad **151** fixes or releases the pan tilt camera module **140** as it is in close contact with or separated from a lower surface of the pan tilt camera module **140** in a state of facing the lower surface of the pan tilt camera module **140** in the main body housing **110**. The elastic pad **151** may be in close contact with the casing **141** in an elastically transformed state to tightly fix the pan tilt camera module **140**. Accordingly, a situation in which the pan tilt camera module **140** is twisted in a panning direction or a tilting direction by slight vibrations of a parking lot building, shaking of a raceway on which the parking guidance camera apparatus **100** is mounted, a shock, or the like may be prevented. The elastic pad **151** may be formed of a material such as rubber or the like.

The elastic pad **151** may have a shape having an upper portion concavely curved along a curved surface of the casing **141** of the pan tilt camera module **140** and may be in close contact with the casing **141** without a gap to further improve a fixing effect of the pan tilt camera module **140**. The upper portion of the elastic pad **151** may be inclined to be close to the inside of the casing **141** of the pan tilt camera module **140**. Accordingly, the elastic pad **151** may move from the inside of the main body housing **110** to the outside

and may be located to face the casing **141** of the pan tilt camera module **140** at a predetermined interval when initially mounted.

An outer portion of the operation lever **152** is hinge-coupled to the holder **146** to be vertically tilted in a state in which the elastic pad **151** is seated on an upper surface of the outer portion in the main body housing **110**. The operation lever **152** has a hinge shaft **152a**, and the holder **146** has a hinge groove **146b**. In the operation lever **152**, since the portion hinge-coupled the holder **146** is located nearer to the outside than a center of the elastic pad **151**, the elastic pad **151** may be more efficiently in contact with or released from the casing **141** of the pan tilt camera module **140** when vertically tilted.

The operation lever **152** may be coupled to the elastic pad **151** in a concavo-convex structure or may be integrated with the elastic pad **151** by bonding or the like. The operation lever **152** has a screw groove screw-coupled to the fixing knob **153** therein. In the operation lever **152**, an inner portion is elevated according to a rotating direction of the fixing knob **153** to be vertically tilted on the basis of a hinge-coupling shaft between the holder **146** and the outer portion.

In the fixing knob **153**, since a center screw part is screw-coupled to the lower surface of the main body housing **110** and an upper end portion is elevated according to a rotating direction to elevate the inner portion of the operation lever **152**, the elastic pad **151** is in close contact with or separated from the pan tilt camera module **140** by vertical tilting of the operation lever **152**, and a lower end head portion is covered by the parking guidance light **200** in a state of being exposed to the lower portion of the main body housing **110**.

That is, the fixing knob **153** has a head **153a** formed on one end thereof and a screw part **153b** screw-coupled to the operation lever **152** on the other end thereof. Since the head **153a** of the fixing knob **153** is formed in a structure having a center portion configured to protrude in a fan shape, the worker may hold the head **153a** with fingers thereof and easily rotate the head **153a**.

In the fixing knob **153**, the screw part **153b** may be inserted into and screw-coupled to the operation lever **152** from the lower portion of the main body housing **110** through an engaging hole **117** of the main body housing **110** in a state in which the head **153a** faces in a downward direction. The fixing knob **153** may have a ring-shaped protrusion **153c** having a diameter greater than that of the screw part **153b** on the center portion thereof.

In this case, the engaging hole **117** of the main body housing **110** may be formed in a shape configured to allow the ring-shaped protrusion **153c** to be engaged with an outer portion thereof, which has a relatively small size, after the ring-shaped protrusion **153c** of the fixing knob **153** passes through an inner portion thereof. Accordingly, the fixing knob **153** may not be downwardly separated from the main body housing **110** even when separated from the operation lever **152** in a state of being engaged with the engaging hole **117** by the ring-shaped protrusion **153c**.

In the fixing knob **153**, since a lower end portion, that is, the head **153a**, is exposed to the lower portion of the main body housing **110**, the worker raises or lowers the inner portion of the operation lever **152** by rotationally operating the head **153a** of the fixing knob **153**, and thus the elastic pad **151** may be in close contact with or separated from the pan tilt camera module **140**. Accordingly, since the worker may easily fix or release the pan tilt camera module **140**, having the pan angle and the tilting angle are adjusted, from the outside of the main body housing **110** without disassembling

the main body housing **110**, installation convenience may be improved. Further, since the head **153a** of the fixing knob **153** is covered and concealed by the parking guidance light **200** after the pan angle and the tilting angle of the pan tilt camera module **140** are adjusted, an exterior appearance thereof may be enhanced.

The parking guidance light **200** visually shows a situation of the parking lot using light. For example, the parking guidance light **200** may show green light in an empty lot state in which the parking lot has an available parking area and may show red light in a full lot state in which the parking lot does not have the available parking area. The parking guidance light **200** may be formed of a light emitting diode (LED) parking guidance light. In the parking guidance light **200**, a lower portion may have a light emitting portion therein and an upper portion may be attached to the main body housing **110**. The parking guidance light **200** may be connected to the printed circuit board **160** of the camera main body **100** through the connector **210**. The parking guidance light **200** may be controlled by receiving a control signal output from a parking guidance managing server or the like according to the situation of the parking lot through the camera main body **100**.

The parking guidance light **200** is configured to be attachable to or detachable from the lower portion of the main body housing **110**. For example, the parking guidance light **200** may be attached to the main body housing **110** by a magnetic force. Accordingly, the worker may allow the parking guidance light **200** to be conveniently attached to or detached from the main body housing **110**. A permanent magnet **170** may be mounted on the main body housing **110**. The parking guidance light **200** may include a magnetic body such as iron or the like which attach to the permanent magnet **170**. For another example, when engaging bolts which attach to the permanent magnet **170** are mounted on the parking guidance light **200**, the permanent magnet **170** may be mounted on the main body housing **110** to correspond to the engaging bolts. Further, the permanent magnet **170** may be mounted on the parking guidance light **200**.

A safety wire **180** may bind the parking guidance light **200** to the main body housing **110**. Accordingly, since the parking guidance light **200** is attached to the main body housing **110** by the magnetic force in a state of being bound to the main body housing **110** by the safety wire **180**, a risk of falling of the parking guidance light **200** may be prevented. Further, since the worker may connect the parking guidance light **200** to the camera main body **100** in a state of being engaged with the main body housing **110** by the safety wire **180**, working convenience may be improved. For example, the safety wire **180** may be bound to a safety wire bolt **181** on the lower surface of the main body housing **110** in a state of being wound around a ring **220** at an upper portion of the parking guidance light **200**. Of course, the safety wire **180** is not limited to the exemplified embodiments and may be variously configured.

The installation bracket **300** is provided to install the camera main body **100** at a set location of the parking lot. The installation bracket **300** may be fixed to a ceiling of the parking lot by bolting or the like. The installation bracket **300** may be installed on a raceway or the like of the ceiling. The installation bracket **300** may function as a junction box. The installation bracket **300** may take out a connection cable of each of a power cable, a communication cable, and the like through a lower opening thereof.

A mounting structure between the installation bracket **300** and the camera main body **100** will be described below. A plurality of engaging protrusions **310** are formed on a lower

surface of the installation bracket **300** in a circumferential direction. Each of the engaging protrusions **310** may be formed in a shape having a protrusion head **311** having a cross-sectional area greater than that of a protrusion body on a lower end of the protrusion body configured to protrude from the lower surface of the installation bracket **300**. The main body housing **110** includes engaging holes **118a** at which the engaging protrusions **310** are fitted and engaged in the upper surface thereof. Each of the engaging holes **118a** is formed in a shape capable of allowing the protrusion head **311** of the engaging protrusion **310** to pass through one portion thereof and then allowing the protrusion head **311** to be engaged with the other portion thereof according to lateral movement.

Accordingly, since the worker rotates the main body housing **110** in a lateral direction in a state in which the engaging protrusions **310** of the installation bracket **300** passes through the engaging holes **118a** of the main body housing **110**, the engaging protrusions **310** may be mounted on the installation bracket **300** in an engaging method. Here, the main body housing **110** may be locked on the installation bracket **300** by a locking device **320** so that the main body housing **110** is not rotated in the lateral direction in a state of being engaged with the installation bracket **300**.

The locking device **320** may include a latch **321** and a spring **322**. The latch **321** may be supported to be elevated in the installation bracket **300**. An upper portion of the latch **321** is taken out through a side surface opening of the installation bracket **300**. The spring **322** applies an elastic force to the latch **321** in a downward direction. The main body housing **110** has a locking groove **118b** into which a lower portion of the latch **321** is fitted in a state in which the main body housing **110** rotates to the set location to be engaged with the installation bracket **300**.

When the worker rotates the main body housing **110** in the lateral direction in a state where the engaging protrusions **310** of the installation bracket **300** are passed through the engaging holes **118a** of the main body housing **110**, the latch **321** is pushed by the upper surface of the main body housing **110** and ascends. In this case, the spring **322** is elastically transformed. In this state, when the main body housing **110** rotates to the set location to be engaged with the installation bracket **300**, the latch **321** descends due to an elastic force of the spring **322** and is fitted into the locking groove **118b**. Accordingly, the main body housing **110** may be locked so as not to rotate in the lateral direction in the state of being engaged with the installation bracket **300**.

In this state, when the worker rotates the main body housing **110** to a location in which the engaging protrusions **310** may be separated from the engaging holes **118a** after raising the upper portion of the latch **321** using fingers thereof, the main body housing **110** may be separated from the installation bracket **300**.

The camera main body **100** may include at least one ring **119** on the main body housing **110**. Further, the installation bracket **300** may include a working cable **330** engaged with the ring **119** through a hook **331** in one end thereof to hang and hold the camera main body **100** thereon. Accordingly, since the worker may connect the connection cable of the installation bracket **300** to the camera main body **100** in a state in which the camera main body **100** is engaged with the installation bracket **300** by the working cable **330**, the working convenience may be improved.

Since a plurality of rings **119** are arranged in the main body housing **110** at a predetermined interval in a circumferential direction, the worker may conveniently engage the hook **331** of the working cable **330** with the corresponding

ring 119 according to a working location. The hook 331 of the working cable 330 may be configured to maintain a state in which one portion thereof is closed by an elastic force. The hook 331 may be formed of a conventional configuration. Accordingly, the hook 331 may be stably maintained in a state of being engaged with the ring 119.

Meanwhile, the camera main body 100 may further include at least one tilt camera module 120 and the tilt gimbal 130.

The tilt camera module 120 may be supported by the body housing 110 to be vertically tilted in a state of being partially inserted into the camera mounting hole 113 of the main body housing 110. Accordingly, the tilt camera module 120 may be vertically tilted according to the installation environment of the parking lot, and a photographing angle of the tilt camera module 120 may be adjusted. The tilt camera module 120 photographs a corresponding area in the parking lot in real time so that the photographed image information is provided to the parking guidance managing server or the like through the wired and wireless communications.

The tilt camera module 120 may include a lens forming an optical image of a subject and an image sensor configured to convert the optical image formed by the lens to an electrical signal. Further, the tilt camera module 120 may include a casing 121 configured to embed the image sensor therein and a lens barrel 122 on which the lens is mounted. The casing 121 may be formed in a cylindrical shape cut in a longitudinal direction to have a cross-sectional area greater than a half-circle cross-sectional area. The lens barrel 122 may be connected to a center of a curved surface of the casing 121. A lens cover 123 may be attachable to or detachable from the lens barrel 122.

Referring to FIGS. 8 and 10, the casing 121 may include hinge protrusions 121a on both side surfaces thereof. In the main body housing 110, hinge pieces 115 facing both side surfaces of the casing 121 may be formed around the camera mounting hole 113. Each of the hinge pieces 115 has a hinge hole 115a. The hinge protrusions 121a are fitted into the hinge holes 115a to support vertical tilting of the casing 121. Accordingly, the tilt camera module 120 may be supported to be vertically tilted on the basis of the main body housing 110.

In the casing 121, fixing grooves 121b may be formed at a predetermined pitch on at least one side surface along a circumferential direction. The hinge pieces 115 may include fixing protrusions 115b corresponding to some of the fixing grooves 121b of the casing 121. The fixing protrusion 115b is fitted into the facing fixing groove 121b among the fixing grooves 121b along a tilting angle of the casing 121. Accordingly, the tilt camera module 120 may be temporarily fixed in a state in which an angle thereof is adjusted, and the worker may feel a click sensation when the tilting angle of the tilt camera module 120 is adjusted.

The fixing protrusions 115b may be incised in a downward direction from both sides of an upper end and connected to the hinge pieces 115. The fixing protrusions 115b may be easily bent around portions connected to the hinge pieces 115 and thus may easily move between the fixing grooves 121b when the casing 121 is vertically tilted.

The tilt gimbal 130 fixes the tilt camera module 120 in the state in which the tilting angle of the tilt camera module 120 is adjusted. The tilt gimbal 130 includes an elastic block 131, an elevation block 132, and a fixing knob 133.

The elastic block 131 fixes or releases the tilt camera module 120 as it is in close contact with or separated from a lower surface of the tilt camera module 120 in a state of facing the lower surface of the tilt camera module 120 in the

main body housing 110. The elastic block 131 may be in close contact with the casing 121 in an elastically transformed state to tightly fix the tilt camera module 120. Accordingly, a situation in which the tilt camera module 120 is twisted in a tilting direction by slight vibrations of the parking lot building, shaking of the raceway on which the parking guidance camera apparatus is mounted, shock, or the like may be prevented. The elastic block 131 may be formed of a material such as rubber or the like.

The elastic block 131 may have a shape having an upper portion concavely curved along a curved surface of the casing 121 of the tilt camera module 120 and may be in close contact with the casing 121 without a gap to further improve a fixing effect of the tilt camera module 120. The upper portion of the elastic block 131 may be inclined to be close to the inside of the casing 121 of the tilt camera module 120. Accordingly, when initially mounted, the elastic block 131 may move from the inside of the main body housing 110 to the outside and may be located to face the casing 121 of the tilt camera module 120 at a predetermined interval.

The elevation block 132 is supported by the main body housing 110 to be elevated in a state in which the elastic block 131 is seated. The elevation block 132 may be coupled to the elastic block 131 in a concavo-convex structure or may be integrated with the elastic block 131 by bonding or the like. The elevation block 132 has a screw groove screw-coupled to the fixing knob 133 at a lower portion thereof.

The elevation block 132 may be elevated by an elevation guide 134 to be guided to the main body housing 110. The elevation guide 134 may include guide protrusions 134a formed on both side surfaces of the elevation block 132. The main body housing 110 may include guide pieces 116 each facing the guide protrusions 134a.

Each of the guide pieces 116 may have a guide groove 134b for guiding elevation with the guide protrusion 134a fitted thereto. Accordingly, the elevation block 132 may be elevated and guided by the guide protrusions 134a and the guide grooves 134b without lateral rotation. As another example, the guide protrusions 134a may be formed on the guide pieces 116, and the guide grooves 134b may be formed in the elevation block 132.

An upper portion of the fixing knob 133 is screw-coupled to the elevation block 132 to elevate the elevation block 132 according to a rotating direction thereof so that the elastic block 131 is in close contact with or separated from the tilt camera module 120, and a lower end portion of the fixing knob 133 is exposed to the lower portion of the main body housing 110. The fixing knob 133 is covered by the parking guidance light 200 in a state in which the lower end portion thereof is exposed to the lower portion of the main body housing 110.

The fixing knob 133 may be configured to be identical to the fixing knob 153 of the pan tilt gimbal 150. The fixing knob 133 may have a head 133a formed in one end thereof, a screw part 133b screw-coupled to the elevation block 132 in the other end thereof, and a ring-shaped protrusion 133c having a diameter greater than that of the screw part 133b in a center portion thereof.

As described above, in the fixing knob 133, since a lower end portion, that is, the head 133a is exposed to the lower portion of the main body housing 110, the worker may raise or lower the elevation block 132 by rotationally operating the head 133a of the fixing knob 133 so that the elastic block 131 may be in close contact with or separated from the tilt camera module 120.

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Accordingly, since the worker may easily fix or release the tilt camera module **120** having the tilting angle adjusted from the outside of the main body housing **110** without disassembling the main body housing **110**, installation convenience may be improved. Further, since the head **133a** of the fixing knob **133** is covered and concealed by the parking guidance light **200** after the tilting angle of the tilt camera module **120** is adjusted, an exterior appearance thereof may be enhanced.

When a pair of tilt camera modules **120** are provided and disposed at both sides of the main body housing **110**, a pair of tilt gimbals **130** may be provided to fix the tilt camera modules **120** in a state in which a tilting angle of each of the tilt camera modules **120** is adjusted.

An example of a method of installing the above-described parking guidance camera apparatus in the parking lot will be described below.

First, the worker installs the installation bracket **300** at the set location of the parking lot and takes out the connection cable. For example, the installation bracket **300** may be bolted and installed on the ceiling of the parking lot, and the connection cable may be taken out through a lower opening of the installation bracket **300**.

Further, the camera main body **100** is hung on the installation bracket **300** by the working cable **330** of the installation bracket **300**. In this case, the hook **331** of the working cable **330** is engaged with the ring **119** of the camera main body **100** to hang and hold the camera main body **100**. Further, the connection cable is connected to the camera main body **100**. In this case, the connection cable is connected to the power input port **161** and the communication port **162** exposed to an upper portion of the camera main body **100**.

In addition, the camera main body **100** is mounted on the installation bracket **300**. In this case, the camera main body **100** is rotated to the set location in a lateral direction to be engaged with the installation bracket **300** after the engaging protrusions **310** of the installation bracket **300** are passed through the engaging holes **118a** of the camera main body **100**. In addition, the latch **321** of the installation bracket **300** is fitted into the locking groove **118b** of the camera main body **100** by the spring **322** to be completely mounted thereon.

In addition, the external monitor is connected to the monitor connection port **163** of the camera main body **100**. In this case, the external monitor is connected to a monitor connection port for a pan tilt camera module **140** exposed through the lower portion of the camera main body **100**. Further, since the fixing knob **153** of the pan tilt gimbal **150** is rotated and the operation lever **152** is tilted in an upward direction with respect to the holder **146** after adjusting the panning angle and the tilting angle of the pan tilt camera module **140** supported by the holder **146** of the camera main body **100** to be laterally panned and vertically tilted on the basis of the image information provided through the external monitor, the elastic pad **151** is in close contact with the pan tilt camera module **140** to fix the pan tilt camera module **140**.

When the tilting angle of the tilt camera module **120** is desired to be adjusted, the external monitor is connected to a monitor connection port for a tilt camera module. Further, since the fixing knob **133** of the tilt gimbal **130** exposed to the lower portion of the camera main body **100** is rotated and the elastic block **131** is raised after adjusting the tilting angle of the tilt camera module **120** supported by the camera main body **100** to be vertically tilted on the basis of the image

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information provided through the external monitor, the tilt camera module **120** may be fixed.

In addition, the parking guidance light **200** is bound to the camera main body **100** by the safety wire **180** and connected to the camera main body **100** by the connector **210**. In this case, the parking guidance light **200** may be connected to the camera main body **100** in a state of being engaged with the camera main body **100** by the safety wire **180**. Next, since the parking guidance light **200** is attached to the lower portion of the camera main body **100** by the magnetic force in a state in which the fixing knobs **133** and **153** are covered, installing the parking guidance camera apparatus is completed.

According to the present disclosure, since a pan tilt camera module having a pan angle and a tilting angle are adjusted can be easily fixed to or released from the outside of a main body housing by a fixing knob of a pan tilt gimbal without disassembling the main body housing of a camera main body, installation convenience can be improved. According to the present disclosure, since the fixing knob of the pan tilt gimbal is covered and concealed by a parking guidance light attachable to or detachable from the camera main body after the pan angle and the tilting angle of the pan tilt camera module are adjusted, an exterior appearance thereof can be enhanced.

Although the present disclosure is described with reference to embodiments shown in the accompanying drawings, the above descriptions are only exemplary embodiments, and it should be understood by those skilled in the art that various changes and other equivalent embodiments may be made from the above descriptions. Accordingly, the scope of the present disclosure should be defined by the scope of the claims and their equivalents.

What is claimed is:

1. A parking guidance camera apparatus comprising:
 - a camera main body including a main body housing, a pan tilt camera module partially inserted into a camera mounting hole of the main body housing, a holder configured to support the pan tilt camera module on the main body housing so that the pan tilt camera module is laterally panned and vertically tilted, and a pan tilt gimbal configured to fix the pan tilt camera module in a state in which a panning angle and a tilting angle of the pan tilt camera module are adjusted;
 - a parking guidance light detachably attached to a lower portion of the main body housing; and
 - an installation bracket configured to install the camera main body at a set location in a parking lot, wherein the pan tilt gimbal includes an elastic pad configured to fix or release the pan tilt camera module as the elastic pad is in close contact with or separated from a lower surface of the pan tilt camera module in a state of facing the lower surface of the pan tilt camera module in the main body housing, an operation lever having an outer portion hinge-coupled to the holder to be vertically tilted in a state in which the elastic pad is seated on an upper surface of the outer portion in the main body housing, and a fixing knob having an upper portion screw-coupled to an inner portion of the operation lever to vertically tilt the operation lever according to a rotating direction thereof so that the elastic pad is in close contact or separated from the pan tilt camera module, and having a lower end portion covered by the parking guidance light in a state of being exposed to a lower portion of the main body housing,
 - wherein the camera main body further includes at least one tilt camera module supported by the main body

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housing to be vertically tilted in a state of being partially inserted into a camera mounting hole of the main body housing, and a tilt gimbal configured to fix the tilt camera module in a state in which a tilting angle of the tilt camera module is adjusted,

wherein the tilt gimbal includes an elastic block configured to fix or release the tilt camera module as the elastic block is in close contact with or separated from a lower surface of the tilt camera module in a state of facing the lower surface of the tilt camera module in the main body housing, an elevation block supported by the main body housing to be elevated in a state in which the elastic block is seated, and a fixing knob having an upper portion screw-coupled to the elevation block to elevate the elevation block according to a rotating direction thereof so that the elastic block is in close contact with or separated from the tilt camera module, and having a lower end portion covered by the parking guidance light in a state of being exposed to the lower portion of the main body housing.

2. The parking guidance camera apparatus of claim 1, wherein the parking guidance light is attached to the main body housing by a magnetic force.

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3. The parking guidance camera apparatus of claim 1, wherein:

the camera main body includes at least one ring on the main body housing; and

the installation bracket includes a working cable engaged with the ring through a hook in one end thereof to hang and hold the camera main body.

4. The parking guidance camera apparatus of claim 1, further comprising a safety wire configured to bind the parking guidance light to the main body housing.

5. The parking guidance camera apparatus of claim 1, wherein the camera main body includes at least one monitor connection port exposed from a lower portion of the main body housing.

6. The parking guidance camera apparatus of claim 1, wherein:

a pair of tilt camera modules are provided to be disposed at both sides of the main body housing; and

a pair of tilt gimbals are provided to fix the tilt camera modules in a state in which a tilting angle of each of the tilt camera modules is adjusted.

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